

# **Geo-Seas**

## **Pan-European infrastructure for management of marine and ocean geological and geophysical data**



### **D11.5 Geo-Seas 3D DTM viewer installation manual**

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Geo-Seas 3D DTM viewer installation manual for the Geo-Seas DTM prototype				
Short Description				
This document comprises the primary documentation for installation and use of the 3D viewer software package developed for viewing the Geo-Seas Digital Terrain Model (DTM) data sets produced according to the Geo-Seas methodology (described in D11.4). Also included are the conditions of use and downloading procedures to obtain the viewer application.				
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## Executive Summary

This document comprises the primary documentation for the installation and use of the 3D viewer software package developed for viewing the Geo-Seas Digital Terrain Model (DTM) data sets produced according to the Geo-Seas methodology (described in D11.4). The document is divided into five sections covering:

- An introduction to the viewer software including its purpose, functionality, derivation, and key features.
- Licensing of the contents, terms and conditions of the 3D viewer end-user license that governs the use of the viewer, and intellectual property issues.
- Detailed instructions explaining how to download a copy of the viewer from the Geo-Seas portal
- Detailed instructions explaining how to install the viewer including system requirements and known issues and solutions.

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## 1 Introduction

The *Geo-Seas-3D Viewer* is an innovative and high-performance tool for viewing, interacting with and manipulating data types such as Digital Terrain Models (DTM) and web map service (WMS) which are plugged into a virtual globe.

It has been designed for the purposes of:

- In-depth evaluation of data set content to assess the quality of a DTM (resolution, coverage, quality) using basic GIS functionalities,
- Combining data layers such as sample location, sediment properties etc. using WMS from other data sources to assist end-users searching for data or analyzing interactions between processes on the seabed or between the water column and topographic features.
- Demonstrating the concept of making this type of service available to end-users without them requiring specific skills to install or to use the service.

The viewer is based on NasaWorldWind (1) and is a derivative of the SonarScope - 3DViewer ([http://www.ifremer.fr/fleet/acous\\_sism/sonarscope/SSC3D.html](http://www.ifremer.fr/fleet/acous_sism/sonarscope/SSC3D.html)) which is primarily aimed at displaying DTM and water column data, such as bubbles and other features detected by SonarScope algorithms (2). The 3D viewer is a freeware module maintained as a component of Ifremer's *Global Oceanographic Bathymetry Explorer GLOBE* software (<http://flotte.ifremer.fr/fleet/Presentation-of-the-fleet/On-board-software>).

Figure 1. below shows the appearance of the main pane of the graphic user interface (GUI).

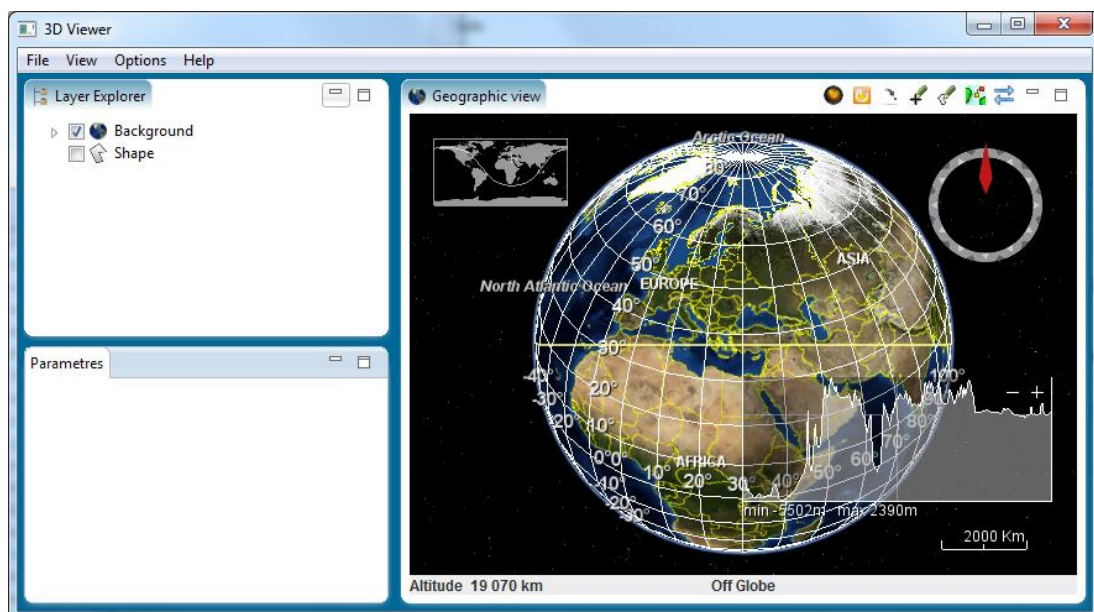


Figure 1: Start page of the Geo-Seas DTM 3D Viewer

Key features of the viewer are:

- DTM elevation and resolution are correctly and independently rendered, in contrast with other methods which consist of a simple image draped over the software's own DTM, e.g. as is the case in Google Earth export (Public Version).
- Vertical exaggeration can be adjusted up to a maximum of 20 times which is expected to be sufficient for most sea floor representations.
- The variety of different geo-referenced scientific data themes (oceanography, geology, etc.) that can be downloaded from WMS servers which are viewable.
- The Geo-Seas 3D viewer has been specifically designed to allow quick and easy 3D viewing of DTMs made available in the NetCDF transport format which has been specified and adopted by the Geo-Seas infrastructure (<http://www.geo-seas.eu/>). The viewer also uses the DTM source data layers produced with the Geo-Seas standard procedure. This enables users to access the metadata for the source datasets in each DTM cell by means of the unique identifier from the Geo-seas/SeaDataNet Common Data Index (CDI). ([http://www.geo-seas.eu/v\\_cdi\\_v2/search.asp](http://www.geo-seas.eu/v_cdi_v2/search.asp))
- European Seas: bathymetric grids, produced as part of the Hydrography and Seabed mapping preparatory actions for the European Marine Observation and Data Network (EMODnet) <http://www.emodnet-hydrography.eu/>, which can be downloaded in the Geo-Seas transport format and also viewed using the 3D Geo-Seas viewer.
- These standard format grids can be produced using Generic Mapping Tool (GMT) and scripts developed specifically for this purpose (see <http://www.geo-seas.eu/> for downloading) or by using various software tools such as Caribes or Sonarscope (<http://flotte.ifremer.fr/fleet/Presentation-of-the-fleet/On-board-software>).
- The *Geo-Seas 3DViewer* is a complete standalone application based on Nasa WorldWind technology and associated 3D engine. It is developed in Java, and available on all platforms running Nasa WorldWind.

## 2 Details of the user license

### 2.1 Description of the software

The Geo-Seas-3D Viewer Software is a geographical 3D Viewer which enables innovative and high performance 3D viewing for data such as Digital Terrain Models (DTM) and web map services (WMS) in a virtual globe environment. The Geo-Seas-3D Viewer is provided as a means to demonstrate viewing services for DTMs that have been produced in accordance with the proposed Geo-Seas standard methodology.

## 2.2 Access to the software

The Geo-Seas-3D Viewer Software is a freeware. In order to access it users must register and accept the terms and conditions of the Geo-Seas 3D viewer licence for downloading the software from the Geo-Seas portal (<http://www.geo-seas.eu/>). Downloading and using the software indicates user's acceptance of the terms and conditions of use.

## 2.3 Terms and conditions of use

1. The licensor grants to the licensee a non-exclusive and non-transferable licence to retrieve and use the Geo-Seas 3D viewer software from the Geo-Seas service in accordance with this licence. This licence is not valid for commercial applications.
2. Retrieval, by electronic download, of the Geo-Seas 3D Viewer Software is free of charge, unless otherwise stipulated.
3. The Geo-Seas-3D viewer software is provided without warranty of any kind. Geo-Seas and Ifremer do not accept any liability for the use of the software (damage for loss of business profits, interruption of business activity, loss of business information, or other monetary loss).
4. Users must acknowledge Ifremer in all publications showing results obtained using the software or communications based on these results. Users shall mention %Geo-Seas-3D Viewer Software% written in a readable manner.
5. Data users should not provide the Geo-Seas-3D Viewer software to third parties without prior consent from Ifremer.

## 2.4 Intellectual Property

All copyrights on the Geo-Seas-3D Viewer software are held exclusively by Ifremer. The software is protected by under the terms of French law and also International Conventions.

## 3 Instructions for downloading the viewer

The 3D viewer is freely available for general use provided the user has registered in Geo-Seas portal (%Product+section) and has accepted the conditions of use. To obtain the viewer go to <http://www.geo-seas.eu/>.

Select %Product+

Select %Digital Terrain Model and 3D viewing software+





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## Development and demonstration of a Digital Terrain Model and 3D viewing software

Following the user consultation Geo-Seas undertook developments for:

- Definition of the characteristics of bathymetric grids (digital terrain models) as required by end-users
- Specification of procedures for combining different data sources and features in a target digital terrain model (DTM)
- Development of a pilot DTM as a case study in order to evaluate the feasibility of generating such grids and services in accordance with end-user requirements whilst taking into account the constraints resulting from the use of multiple datasets from a variety of data sources (the data being made available by Geo-Seas data centres).

The analysis has resulted in a **document with a list and definitions of DTM products with guidelines for description and representation based on user requirements**. This provides the specifications for the generation of prototype bathymetric digital terrain models (DTMs) and 2D and 3D tools for viewing the DTMs.

A 3D visualisation tool (3D Viewer) based on the existing open source NASA World Wind JSK application has been developed. This software is freely available after registration and allows the visualisation of Digital Terrain Models (DTM) in the existing CARAIBES NetCDF format and Web Map Service (WMS) which are plugged into a virtual globe.

- **Register and Download the 3D DTM Viewer software**
- **Manual of 3D DTM Viewer**

A case study has been developed to validate the process for the production of a complex DTM. Data have been made available (x,y,z) for an area where data sets of various resolutions and origins exist for the southern Celtic Sea (Irish and French data sets). These data have been gridded using the specification outlined above and then merged in order to prove the feasibility of the process for the development of complex digital terrain models using gridded x, y, z data at varying resolutions.

- **Download 2 DTM files in the NetCDF Geo-Seas transport format for the 3D Viewer**

Each file contains a series of layers among which a "depth" layer

**Products**

- DTM and 3D Viewer
- Porcupine Borehole Viewer
- Seabed habitat mapping standardisation

**Tools**

- Contact
- Extranet
- Sitemap
- Home

**News**

- International Conference - 9-10 October 2012 - PROGRAMME and FINAL ANNOUNCEMENT now available
- Geo-Seas International workshop - 9 & 10 October 2012
- Geo-Seas at the 34th Session of the International Geological Congress
- Project Review successful
- More news >

**Figure 2: Downloading page of the Geo-Seas portal**

Download and read the documentation and files which include:

- the installation manual
- the end-user manual
- DTM files in the appropriate format for testing



You must then register in order to download the software



The screenshot shows the Geo-Seas website interface. The top navigation bar includes links: Overview | Metadata | Data access | Products | Standards & Software | Meetings | Promotion | Partners. The main header features the Geo-Seas logo and the text 'Pan-European infrastructure for management of marine and ocean GEOLOGICAL AND GEOPHYSICAL DATA'. The left sidebar contains 'Products' (DTM and 3D Viewer, Porcupine Borehole Viewer, Seabed habitat mapping standardisation) and 'Tools' (Contact, Extranet, Sitemap, Home). The main content area is titled 'Request for downloading the Geo-Seas 3-D DTM Viewer' and includes a form for user registration. The form fields are: Organisation, Contact person, Address, Zipcode, City, Country (dropdown), Telephone contact, and E-mail contact. Below the form is a 'License agreement' section with the title 'Geo-Seas 3D Viewer Software user license' and a 'Presentation of the Software' section describing the viewer's capabilities. The right sidebar contains 'News' with several announcements and two images of marine research vessels.

Figure 3: Downloading request form

## 4 Viewer installation procedures

### 4.1 Prerequisites

The Geo-Seas - 3D DTM viewer is visual and graphic software which relies on the hardware capabilities of the user's computer for optimal performance. Hardware issues may cause the application to encounter problems when integrating DTM files or at times the rendering may not be optimal (data quantification for example). These effects are most likely to occur if the machine has an old or outdated Graphic Process Unit (recommended configuration: 2007 or more recent Nvidia or ATI cards) or the driver has not been updated.

The present version is designed for 64 bit :Windows, MacOS and Linux. Systems (the Linux version has not been subject to advanced tests).

The software requires 4GB RAM are required and for large DTM file with a layer of CDI identifiers, 8 GB is recommended. Successful tests were performed with

DTMs up to 300MB but the upper limit is not precisely known however problems can occur when loading the DTM, especially when tiling.

Key recommendations can be obtained from the NASA website as follows:

- information about configurations can be obtained from :  
<http://worldwind.arc.nasa.gov/java/>
- instruction on how to update the driver:  
<http://worldwind.arc.nasa.gov/java/video.html>

## 4.2 Installing Java

The viewer has been designed to work with the Oracle's Java execution environment JRE version 6 or later (Java Runtime Environment). To ensure the correct version of Java is installed it is recommended to use JRE 6 (Note that JRE X is the JRE for Java X).

**Note:** when uninstalling or installing a new version of Java this can cause problems with other applications that are also using Java. Ifremer cannot accept responsibility for any problems that are caused with other software installed on a user's computer. as a result of installing the 3D viewer.

### a) Windows

- Make sure that the java version on your computer is 1.6 or above
- To check the version of Java installed on your computer follow these steps:
  - Open 'Start' menu
  - Select 'Accessories'-'Command prompt'
  - Enter 'java -version'
- If the result is not : java version "1.6.xxxx" or greater, uninstall all existing versions of java and install 1.6 version as follows:
  - Download the JRE 6 - 64 bits at :  
<http://www.oracle.com/technetwork/java/javase/downloads/jre6downloads-1902815.html>  
  
Install the jre-6u39-windows-x64.exe file.
  - Check the version again. The version should be greater than or equal to 1.6

### b) Mac OS

- Make sure that the version of java on your computer is 1.6 or above

- To check the version of Java on your computer:  
On a terminal, enter : `java -version`
- If the result is not : `java version "1.6.xxxx"` or greater, uninstall all existing versions of java and install 1.6 version as follows:
  - Download the JRE 6- 64 bits JavaForOSX.dmg at:  
<http://support.apple.com/kb/DL1572>
  - Install the JavaForOSX.dmg

### c) Linux (validated with CentOS 6.3)

- Make sure that the java version on your computer is 1.6 above
- To check the version of Java installed on your computer:  
Enter the following command: `java -version`
- If the result is not : `java version "1.6.xxxx"`, install version 1.6 following these steps :
  - Download package `jre-6u39-linux-x64-rpm.bin` on Oracle website:  
(<http://www.oracle.com/technetwork/java/javase/downloads/jre6downloads-1902815.html>)
  - Execute the file as root user.  
Then execute the 2 following commands:
    - `alternatives --install /usr/bin/java java /usr/java/jre1.6.0_39/bin/java 120`
    - `alternatives --config java`

2 programs which provide 'java'.  
should appear in the following result:

Selection Command

```
-----  
+ 1 /usr/lib/jvm/jre-1.4.2-gcj/bin/java  
* 2 /usr/lib/jvm/jre-1.6.0-sun/bin/java
```

- Enter to keep the current selection [+], or enter the selection number [2] to select the "sun" version :
- Check again java version. You must have :  
`java version "1.6.0_xx"`  
`Java(TM) SE Runtime Environment (build 1.6.0_xx-yyy)`  
`Java HotSpot(TM) 64-Bit Server VM (build xx.y-zzz, mixed mode)`

where xx, yyy, zzz are subject to changes upon last revisions.

## 4.3 GPU drivers

It is important that your GPU driver is up to date. Using an old version driver can lead to a JVM crash as soon as VIEWER tries to display any OpenGL view. To update your driver:

### NVIDIA driver for Windows

Visit the site: <http://www.nvidia.com/Download/index.aspx?lang=en-us> and update your driver.

### ATI driver for Windows

Visit the site: <http://support.amd.com/us/Pages/AMDSupportHub.aspx> and update your driver.

### NVIDIA driver for Linux

It is important to fully update your system before proceeding with the driver installation.

Therefore, first install all the latest system updates using:

```
yum update
```

Download the NVIDIA driver at [www.nvidia.com/Drivers](http://www.nvidia.com/Drivers).

To identify which NVIDIA chip-set is used on your PC, use the **lspci** command. The Nouveau driver which ships with CentOS is enabled by default. It is this driver that allows the high-resolution start up screen to render correctly. If you require the Nvidia driver, you will need to remove this driver first.

This can be accomplished in several ways.

The quickest and simplest method is to add a small entry to the kernel line in the GRUB/**boot/grub/menu.lst** file. Just append **rdblacklist=nouveau** and the next time your kernel boots, it will display the old, low-resolution Plymouth three-color bar splash with no Nouveau graphics.

The second, more permanent option is to blacklist the module using the **/etc/modprobe.d/blacklist.conf** file.

Once the system boots, verify that the driver is not loaded using the command:

```
/sbin/lsmmod | grep nouveau
```

Next drop to the text-only console, because the driver cannot install when the graphics drivers are in use. To do this, switch into runlevel 3:

```
init 3
```

Login as root and locate the downloaded NVIDIA driver on your hard disk. Make the file executable and then run it.

```
chmod +x <Nvidia file>.run ./<Nvidia file>.run
```

Follow the prompts provided by the NVIDIA installer text wizard.

Once this step is complete, go back into runlevel 5.

### **init 5**

You will see the NVIDIA splash, which indicates that the installation has completed correctly, but to confirm this open the NVIDIA control panel and make sure the driver is working correctly.

## **4.4 Software installation**

The current version of the software is designed for a 64 bit system. Please check your system before attempting to install the viewer as it will not work properly on 32 bit operating systems.

The installation procedure installs the following elements in the directory that has been selected during the installation process:

- Executable file
- Uninstallation item
- Libs directory,
- The Geo-Seas Viewer executable.

To install the software follow the instructions below according to your operating system:

### **a) Windows**

- First check that you have full administrator rights on your computer.
- Download and run the VIEWER software installer 3DViewerSetup-1.2.4. The automatic install wizard will guide you through the required steps. It is recommended NOT to change the default installation folder (directory) that the wizard suggests as this can cause problems later.
- The VIEWER software icon will be placed on the desktop. Double click this icon to start the application.

### **b) MacOS**

- Download the file :  
1.2.4-fr.ifremer.3dviewer.gui.product-macosx.cocoa.x86\_64.zip
- Unzip the file and double click on the directory you have unzipped :

If you do not have execution rights, set them with :

```
chmod +x 1.2.4-fr.ifremer.3dviewer.gui.product-  
macosx.cocoa.x86_64.zip\1.2.4-  
fr.ifremer.3dviewer.gui.product-  
macosx.cocoa.x86_64\Viewer3D.app\Contents\MacOS\Viewer3D
```

### c) Linux

- Download the VIEWER software file :  
1.2.4-fr.ifremer.3dviewer.gui.product-linux.gtk.x86\_64.zip.
  - Create a Viewer directory.
  - Extract the zip file into this directory.
  - Run the Viewer command :  
1.2.4-fr.ifremer.3dviewer.gui.product-  
linux.gtk.x86\_64/Viewer3D

If you do not have the execution rights, set them with :  
`chmod +x Viewer3D`

The main viewer window should now be visible.

### NasaWorldWind's cache for non-networked computers

NasaWorldWind software is used as a 3D Earth viewer (VIEWER & GeoView).

For disconnected computers, a cached version is available as Earth.zip which should be copied into the following directory according to your operating system :

- on Windows  
`C:\ProgramData\WorldWindData`
- on MacOS  
`/Library/Caches/WorldWindData.`
- on Linux,  
`$HOME/var/cache/WorldWindData`  
or  
`/var/cache/WorldWindData`

When unzipped the Earth.zip, you should include a directory called  
`$HOME/var/cache/WorldWindData/Earth,`  
`/var/cache/WorldWindData/Earth, or`  
`/Library/Caches/WorldWindData/Earth.`



## 4.5 Uninstall procedure

To remove the 3D viewer from your computer you will need to follow the following procedure according to your operating system:

- Windows:  
Users should click on the %uninstall+icon which is available in the VIEWER program group
- MacOS  
Delete the directory  
`1.2.4-fr.ifremer.3dviewer.gui.product-macosx.cocoa.x86_64`
- Linux:  
Delete the VIEWER software directory.

## 4.6 Helpdesk

In the event that problems are experienced during the installation or use of the 3D viewer then contact the Help Desk by sending an email to [globe-assistance@ifremer.fr](mailto:globe-assistance@ifremer.fr).

For further information on the Geo-Seas project and the DTM and format contact Geo-Seas on <http://www.geo-seas.eu/>

## **Annex A.      References**

- (1) NASA WORLD WIND, Copyright ©, 2001, United States Government as represented by the Administrator of the National Aeronautics and Space Administration, All rights reserved. <http://builds.worldwind.arc.nasa.gov>
- (2) J. M. Augustin, (2012), Sonar-Scope 3D viewer: software tools for the processing and display of oceanographic data from acoustic sensors, Sea Tech Week Conference, Brest, 2012.

## **Annex B.      Figures and table**

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## Annex C. Terminology

Term	Definition
<b>ATI</b>	Array Technologies Industry. ATI Technologies Inc. was a semiconductor technology corporation specialized in the development of graphics processing units (GPU). In 2006, ATI was acquired by AMD which retired the ATI brand in favor of the AMD name ( <a href="http://www.amd.com/fr/Pages/AMDHomePage.aspx">http://www.amd.com/fr/Pages/AMDHomePage.aspx</a> ). ATI name is still in use among users.
<b>CDI</b>	Common Data Index : common Geo-Seas-SeaDataNet catalogue of observation datasets <a href="http://www.geo-seas.eu/content/content.asp?menu=0020000_000000">http://www.geo-seas.eu/content/content.asp?menu=0020000_000000</a>
<b>CDI-ID</b>	Identifier of a dataset in the CDI
<b>DTM</b>	Digital Terrain Model
<b>EDMO</b>	European Directory of Marine Organizations <a href="http://www.seadatanet.org/Metadata/EDMO">http://www.seadatanet.org/Metadata/EDMO</a>
<b>EMODnet</b>	European Marine Observation and Data Network
<b>FAQ</b>	Frequent Asked Questions
<b>GIS</b>	Geographical Information System
<b>GMT</b>	Generic Mapping Tools ( <a href="http://gmt.soest.hawaii.edu/">http://gmt.soest.hawaii.edu/</a> )
<b>GPU</b>	Graphics Processing Unit
<b>JAVA</b>	Java is a general-purpose, concurrent, class-based, object-oriented language that is specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" meaning that code that runs on one platform does not need to be recompiled to run on another. Java application can run on any Java virtual machine (JVM) regardless of computer architecture. Java is one of the most popular programming languages in use, particularly for client-server web applications.
<b>JRE</b>	Java Runtime Environment. This is the Oracle's Java execution environment
<b>NAIP</b>	National Agriculture Imagery Program
<b>NASA</b>	National Aeronautics and Space Administration
<b>NVIDIA</b>	Nvidia is an American global technology company best known for its graphics processing units (GPUs). Drivers can be downloaded from : <a href="http://www.nvidia.com/Download/index.aspx?lang=en-us">http://www.nvidia.com/Download/index.aspx?lang=en-us</a>
<b>NetCDF</b>	Network Common Data Form : set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data. The project homepage is hosted by the Unidata program at the University Corporation for Atmospheric Research (UCAR) <a href="http://www.unidata.ucar.edu/software/netcdf/">http://www.unidata.ucar.edu/software/netcdf/</a>
<b>RAM</b>	Random Access Monitoring
<b>SRTM</b>	Shuttle Radar Topography Mission
<b>WGS84</b>	World Geodetic System revision dating from 1984. Global Reference system using latitude and longitude as coordinates (equivalent to EPSG projection 4326)

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<b>WMS</b>	Web Map Service: standard protocol for serving georeferenced map images over the Internet that are generated by a map server using data from a GIS database. The specification was developed and first published by the Open Geospatial Consortium
<b>WW</b>	World Wind : NASA World Wind is a graphically rich 3D virtual globe. It combines NASA imagery generated from satellites that have produced Blue Marble, Landsat 7, SRTM, MODIS and more. Website : <a href="http://worldwind.arc.nasa.gov/java/">http://worldwind.arc.nasa.gov/java/</a>
<b>3D</b>	Three dimensions